



Welcome to the 27th issue of the AMWG newsletter. Firstly, I would like to thank Annalisa Christie and Janet Ridout-Sharpe for their stewardship of the newsletter over the last 17 years. As the new editor, I hope to continue to grow and develop the newsletter as a means to inform, discuss, and circulate archaeomalacology matters amongst our peers. The success of the newsletter is reliant on your contributions. I therefore thank everyone who has contributed to this and previous issues of the newsletter and a big thank you to Dr. Stefania Milano for this issue's front-page image. Please keep them coming!

About the Newsletter

The Archaeo + Malacology Newsletter warmly invites contributions related to archaeomalacology in its widest sense. Please email submissions and questions to the editor. **Annual deadlines are 31st January for circulation in February and 31st July for circulation in August.** Current and previous issues of the newsletter are available at archaeomalacology.com.

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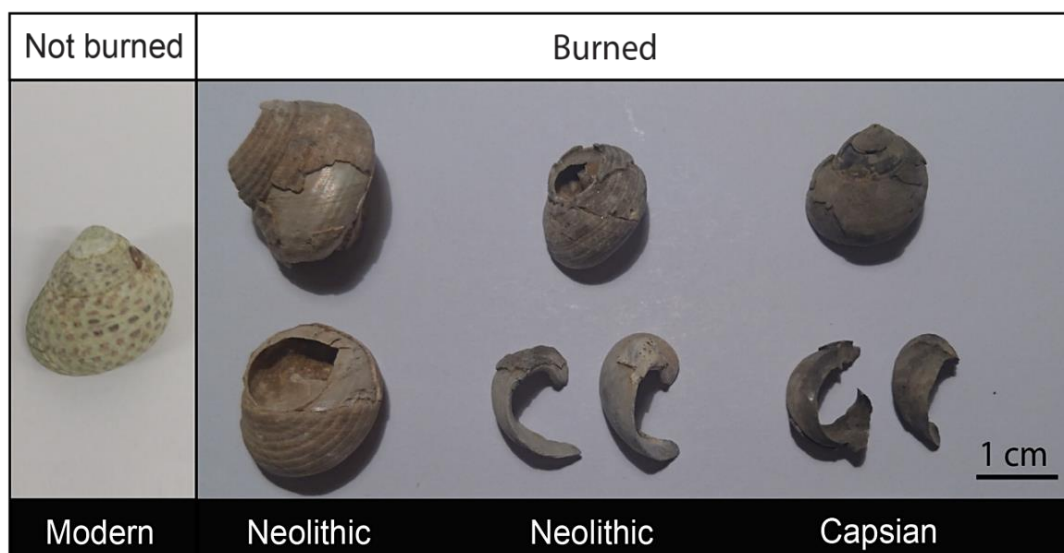
About the Image

The image shows evidence of burning in archaeological shell material. The specimen of the marine gastropod *Phorcus turbinatus* were excavated from different contexts of the Haua Fteah cave, Lybia. The alteration of the typical coloration and consistency of the shell material suggests a certain degree of heat exposure. Based on previous experimental research on the same species by Milano *et al.* (2016)*, the current study aims to estimate the cooking treatment the *P. turbinatus* shells were subjected to. This data will offer new insights into the subsistence behavior of prehistoric populations and improve our knowledge on ancient shellfish cooking processes.

Phorcus turbinatus - Image by Dr. Stefania Milano
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* see Recent Publications p.20



In This Issue

Short Reports	2	Conferences and Events	16
Abstracts	12	Member News and Updates	18
Call for Papers	15	Recent Publications	18

A Record of the Invasive Land Snail *Allopeas gracile* (Hutton, 1834) (Pulmonata: Subulinidae) from a First Millennium BC Archaeological Site in the Southeastern Solomon Islands

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Abstract

The globally invasive land snail *Allopeas gracile* (Hutton, 1834) is reported from the SE-RF-6 Lapita archaeological site at Ngamanie, Ngambelipa Island, Reef Islands, southeastern Solomon Islands, radiocarbon dated at 960–420 BC.

Keywords: Solomon Islands, land snails, Subulinidae, translocation, alien species, prehistory

Introduction

The peoples of the Lapita cultural complex settled islands in the southwestern Pacific Ocean from the Bismarck Archipelago eastward to the Solomon Islands, New Caledonia, Fiji, Tonga, and Samoa beginning some 3300 years ago and were the ancestors of the peoples of Polynesia and eastern Micronesia (Green 1979; Kirch 1997). Sites containing the distinctive dentate-stamped pottery style characteristic of the Lapita cultural complex date from about 3300 to 2700 before present (Burley *et al.*, 2015). As the islands were settled, colonists carried a “transported landscape” of domesticated plants and animals as well as various accompanying commensal species (Kirch, 1997). Among these were about ten species of small terrestrial snails including the subulinid *Allopeas gracile* (Hutton, 1834), formerly known as *Lamellaxis gracilis* or *Opeas gracile*, which is commonly found in pre-Contact archaeological sites from this region (Christensen and Weisler 2013 and references cited therein). It is unlikely that minute land snails were purposely introduced by human colonists; probably they were present in soil or leaf litter packed around the roots of cultigens carried as planting stock for new lands.

This report is the fourth record of *A. gracile* in a Lapita site in the southeastern Solomon Islands. Site SE-RF-6 (formerly BS-RL-6) is located at Ngamanie on an island known variously as Ngambelipa, Lomlom, or Neuwa in the Reef Islands of the Santa Cruz group and was excavated in 1971 by Roger C. Green. The site yielded a

substantial amount of the distinctive pottery characteristic of the Lapita cultural complex (Green, 1976; Green and Jones, 2008). Radiocarbon evidence indicates that the site represents “an occupation of 50 to 100 years duration . . . [that] begins some time in the interval 2910–2470 BP” (Green and Jones, 2008:16), or 960 to 420 BC.

Methods and Materials

At the time of excavation, Green collected sediment samples from all stratigraphic layers. These curated samples were processed recently using standardized methods (Christensen and Weisler, 2013). Two species of land snails were recovered: four immature specimens of *Allopeas gracile* and a single damaged and unidentifiable specimen of a member of the family Pupillidae (*s.l.*). This material has been deposited in the malacological collections of the Bernice P. Bishop Museum, Honolulu, Hawai‘i. The following material was obtained:

Solomon Islands: Temotu Province, Reef Islands, Ngambelipa Island, Ngamanie, Site SE-RF-6, Layer 1. Unidentified pupillid (BPBM 277016; 1 spm.); Layer 2. *Allopeas gracile* (BPBM 277017; 4 spms.). The photograph was taken using a Leitz M165 microscope and camera and the Leica Application Suite software.



Fig. 1. *Allopeas gracile* (Hutton, 1834). Solomon Islands, Reef Islands, Ngambelipa Island (BPBM 277017).

Discussion

Pilsbry (1906–1907: 124) remarked that the species now known as *Allopeas gracile* is “probably the most widely distributed land snail in the world”. It is now circumtropical in distribution as a result of dispersal by human commerce and also occurs outside the tropics, sometimes as a “greenhouse snail” (Pilsbry, 1946; Karlin, 1956). Although it has been suggested that *A. gracile*

originated in the Neotropics (e.g., Pilsbry, 1946), evidence indicates that it originated in the Old World tropics (Christensen and Kirch, 1981; Feulner and Green, 2003; Christensen and Weisler, 2013). It has an extensive paleontological and archaeological record in Africa, the Persian Gulf region, South Asia, and in numerous pre-Contact sites in the islands of tropical Oceania from New Guinea east to the Marquesas Islands in French Polynesia and north to the Hawaiian Islands (Christensen and Weisler, 2013 and references cited therein); additional pre-Contact records from Oceania not cited in that review include sites on the island of Mo'orea in the Society Islands of French Polynesia (Kahn *et al.*, 2015) and on the south coast of Papua New Guinea (David *et al.*, 2015). The species may also have been dispersed by early European commerce, as numerous specimens identified as "*Allopeas* cf. *gracile*" were found in excavations at a 17th century Dutch fort on the island of Mauritius in the Indian Ocean (Peters *et al.*, 2009).

The current record is the fifth report of *A. gracile* from a Lapita site. Three other reports are from islands in the Santa Cruz Group in the southeastern Solomons. Leach and Davidson (2008) reported finding *A. gracile* at the Nenumbo Site (SE-RF-2) on Ngangaua Island in the Reef Islands and at several sites on the island of Taumako, in the Duff Islands. In the southeastern portion of the Santa Cruz Group, Christensen and Kirch (1981) reported it from several Lapita sites on the island of Tikopia. In Fiji, ca. 1500 km to the southeast of the Santa Cruz Group, Hunt (1981) reported it from the Yanuca site on the island of Viti Levu, Fiji, in the deepest contexts associated with dentate stamped Lapita pottery. The present record further demonstrates that this commensal species was already commonly associated with human settlements in the islands of the southwestern Pacific more than two thousand years ago.

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Dietary consumption and purple-dye production in Roman Aquileia: reusing shell-waste as building material

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Introduction and Case studies

Since 2007 the University of Padova has been involved in two excavation projects in Aquileia (northern Italy) targeting the investigation of two prestigious *domus* of the city, the *Domus* of *Tito Macro* (HTM) and the *Domus* of *Bestie ferite* (HBF). The life of these houses spans through several rebuilding activities, from the late Republican period (end of the IInd – Ist cen. b.C.) to the Late Antiquity (IVth – Vth cen. A.D.; cfr. Bonetto and Salvadori, 2012). In the course of the excavations, three different contexts came into light where considerable amounts of shells have been employed as raw building material.

Case 1. Numerous shells were present in a very friable and sandy lime mortar screed of a badly preserved mosaic pavement at HBF, dated to the end of the IVth cen. A.D. It has been possible to remove shells from the mortar matrix and, after polishing procedures, to identify different types of oyster (*Ostrea edulis*, *Ostrea* sp.) and one exemplar of *Cerastoderma* (Fig. 1).

Case 2. Another IVth cen. A.D. mosaic at HBF presents a thin bedding layer (3-6 cm thick) made of highly crushed murex (*trunculus* or *brandaris*) shells, over a sandy earth dump (Fig. 2). The mortar screed of the pavement was set directly above this layer.

Case 3. 911 shells (175 oyster valves, 733 whole gastropods, 3 undetermined) have been employed as foundation layer of an oven dated to the first half of the Ist cen. A.D. This straight layer (10 cm thick) was spread directly over the silt-clay natural ground and it entirely occupies the inner circular area of the structure (Fig. 3).



Fig. 1. HBF. Shells specimens from the mortar screed of late Vth cen. A.D. mosaic.



Fig. 2. HBF. Crushed murex bedding layer of IVth cen. A.D. mosaic.



Fig. 3. HTM. Shell foundation of Ist cen. A.D. oven.

Results and Discussion

Shells in mortars

As reported by the late Roman author Palladius (*Op. Agr.*, I, 40, 3), shells act as good aggregate in mortars. In fact, shells in plasters are frequently attested in the Mediterranean since the Bronze Age (Alberti, 2008) and in floor bedding mortars of the Hellenistic period (Bruneau, 1969: 766-767). In Roman Aquileia, large amounts of *murex*

mixed with lime binder are present in the mortar screed of another mosaic in the area of the HTM (Di Filippo Balestrazzi, 2005: 200-201). Type of shell, selection and quantity make their use certainly intentional.

The voluntary inclusion of shells in mortar mixtures is to be distinguished from their casual occurrence, due to carving of beach sands, where seashell species are common (Law, 2014). For example, the presence of some crushed shells in setting mortars of the *emblema* of the *Asaroton* mosaic of Aquileia (Perpignani and Fiori, 2012: 119, 125) and the attestation of whole shells in the concretes of the Byzantine walls and in the render mortars of the Baptistery of St. Elia in Grado (Buora, 2013: 569) can not be so clearly related to an intentional use.

Shells as bedding layer

Shells in bedding or foundation layers provide a light *substratum*, which stabilizes, compacts and properly drains soil moisture (Law, 2014). Virgilius (*Georg.*, II, 348-350), in fact, indicates the use of porous stones or shell layers under the ground for maintaining the soil dry, during the seeding of vine seeds. These features must have been considered useful not only in agriculture but also for building activities; also in this case, the intentional use of shells (i.e. in regular layers) is to be distinguished from their presence in chaotic dumps of waste materials.

Shell-made layers are frequently documented in pavement beddings or foundations in the Mediterranean in ancient times (Alberti, 2008). In Delos broken *murex* shells have been reported under the screed of Hellenistic mosaics (Bruneau, 1972: 124, n°7) and in Roman *Meninx* (Djerba - Tunisia), *murex* layers, almost 50 cm thick, have been found under the pavement of some houses (Fentress, Drine, Holod, 2009: 163-166). Light-weighted shells constitute a perfect option to loose stones or broken bricks for light drain foundations in wetlands of northern Italy, characterized by very weak soils. In Altino (Venice) two tile *tesserae* pavements present a lower bedding made of oysters set into distinguished deposits. In the same site, the ground based foundations of the fluvial gate doors were realized with oyster valves mixed with broken terracotta fragments (Balista and Sainati, 2003: 333).

Conclusion

Shell reuse as raw building material in northern Italy seem to be attested exclusively in territories close to water basins, such as seas, lakes etc. This is an ingenious and inexpensive technique for re-employing materials originally collected for other purposes such as dietary consumption. In fact, the presence of oyster valves and whole *murices* in cases 1 and 3 of Aquileia is to be related

to an intentional reuse of food waste assemblages. On the other hand, crushed *murex* shells in case 2 are to be considered a byproduct of purple dyeing; they were broken for the extraction of hypobranchial gland, as confirmed by dimensions and types of fractures. Di Filippo Balestrazzi lists a series of sites in north-eastern Italy and *Histria* in which many indicators suggest a purple-dye production in Roman times (Di Filippo Balestrazzi, 2005). Archaeological evidences of *murex* specimens in almost two maritime *villae* on the so called *Lacus Timavi* (Gorizia) (Ventura, Giovannini, Petrucci 2012: 186) and a broken *murex* deposit found in Jesolo (Venice) (Gelichi *et al.*, 2013: 89, Fig 15) provide other evidences for this industry. Aquileia was probably an important center of purple dye production in Roman times too. In fact, it is cited by Forbes for its dye quality (Forbes, 1987: 118); L. Bertacchi also reports the discovery of several *murex* deposit in the course of excavations (Di Filippo Balestrazzi 2005: 200) and two inscriptions refer that *purpurarii* were present in the city (Fig. 4a, b) and in the surrounding region (Brusin, 1991-93). However, production areas have never been archaeologically documented. The discovery of the crushed *murex* layer in the bedding on the IVth cen. A.D. mosaic at HBF is another evidence which provides new proof of a plausible purple dye production in Aquileia.



Fig. 4. a) Funerary inscription from the necropolis of the Annia, out of Aquileia. *M. Luri[us] purpura[r]*. (edited from Brusin, 1991-93: 328, n. 723); b) Funerary inscription from San Canziano d'Isonzo. *M. Pullio M. I. Casto, M. Pulli[o] M. I. Fusco, purpurario, Pullia M. I. Prima M. Flavius Ianuarius, M. Pullius (mulieris) I. Hormus purpurar (ii)* [edited from Brusin, 1991-93: 328, n. 724].

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High-speed assessment of elemental ratios in shell carbonate using LIBS - preliminary results and update on the ACCELERATE Project

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Last year I started a new research project funded by the European Commission (Marie Skłodowska-Curie) on automated elemental analysis of marine shells to get more cost-effective environmental data, called ACCELERATE*. In this project, I am using Laser Induced Breakdown Spectroscopy (LIBS) to analyse elemental ratios in shell carbonate. LIBS is a fast analysis method, able to produce good quality data from samples with little sample preparation effort (García-Escárcaga *et al.*, 2015; Harmon *et al.*, 2013).

What led me to do this project was my PhD at the University of York. As part of my research, I analysed shells of *Conomurex fasciatus* (Born, 1778) and their isotopic composition to determine seasonal exploitation and environmental change on the Farasan Islands in Saudi Arabia. Isotopic analysis, although accurate, can be very time consuming. Hence, a lot of archaeological sites on Farasan are still left to be analysed (thousands of samples currently still waiting for seasonality analysis in York) and made it necessary to create a more efficient method of determining their seasonality.

Generally, having more data points per shell or the ability to have more shells per site, has a lot of advantages. Firstly, it was shown that a large number of samples per shell increases the temporal resolution and thus allows us to determine the season of exploitation more accurately (Jew *et al.*, 2013a, 2013b). Secondly, it is necessary to have a representative number of shells per site to determine a general site-seasonality (Thomas, 2015). Lastly, shells can also be used to create a seasonal structure for a layer or context, enhancing our understanding of site formation process or the use of artefacts (Hausmann and Meredith-Williams, 2016; Thompson and Andrus, 2011).

With these future applications in mind, I have worked on an experimental setup that allows the quick analysis of elemental ratios and their relation to environmental changes during the mollusc's lifetime. In some cases, the ratios between elements (e.g. Mg, Sr, Ba) and Ca have been linked to changes in environmental conditions, notably temperature and salinity, although other

* Archaeological and climatic data from elemental ratios using rapid analysis of shell carbonate.

interplaying factors make more general statements very difficult (Graniero *et al.*, 2017).

To test the performance of my experimental setup, I analysed three shells of marine and lagunar mollusc species, including one gastropod and two bivalves: a fragment of the aperture lip of *Conomurex fasciatus* (Born, 1778), a hinge of *Ostrea edulis* (Linnaeus, 1758), and one complete half of *Anomalocardia flexuosa* (Linnaeus, 1767) from a modern context. The shells are associated with three different sites, from different periods and different regions of the world. The aim here was not to compare three records of the same environment, but to test the experimental setup on a variety of species.

Method

LIBS is a simple, straightforward and versatile technique for rapid analysis of the chemical composition of a huge variety of materials (Harmon *et al.*, 2013). It is based on the atomic emission spectroscopy of plasma, generated by focusing a high intensity laser beam onto the material. The plasma emission is collected and then spectrally resolved. This provides qualitative and quantitative results indicated by the emission line intensities of the elemental constituents of the material.

In the examples here, I chose to measure the intensities of emission lines which correspond to ions of the elements Mg and Ca. The ratios calculated reflect the intensities of specific emission lines and do not directly translate into ratios based on weight or molar ratios, although the relationship is somewhat linear. Hence the 'intensity-ratios' here are reported in arbitrary units (a.u.).

The setup's acquisition process was programmed using LabView software (www.ni.com/labview/) and is divided into two phases (indicated by red and blue arrows in Fig. 1). In the first phase (red), multiple target locations or waypoints are being selected by moving the sample stage to the preferred location, which is visible through the camera. The sample locations are then interpolated between the two (or more) waypoints at a given interval (here 100µm) and put down in a list.

In the second phase, the motorised stage goes through the list of pre-selected sample locations, while acquiring LIBS spectra at each location with an irradiation area of ~90µm in diameter. In each spectrum the mean ratio of the intensity of the two pre selected peaks is calculated and then assigned to the corresponding sample location in the list.

There are two modes that can be chosen from for the second phase of acquisition. The first mode (accumulation) calculates the ratio of selected peaks in a single

'accumulated' spectrum which is an accumulation of several spectra (here 10) in one location. The second mode (single shot) calculates the ratio of selected peaks in each of the 10 spectra separately. While the resulting mean ratio is identical, the two modes have different advantages. The accumulation mode has a faster performance because only one spectrum needs to be analysed, whereas the single shot mode allows the user to assess the standard deviation of the 10 spectra to provide an error for the mean value. As such, the accumulation mode is more suitable for spatially mapping elemental ratios and the single shot mode is more suitable for tracking changes along the direction of growth and thus through time. The typical time spend in one sample location is about 1.7 seconds in accumulation mode and 2.4 seconds in single shot mode. With this configuration a typical analysis of 5 cm translates into 500 sample locations (5,000 spectra) and would require a time of acquisition of about 14 minutes (20 min in single shot mode).

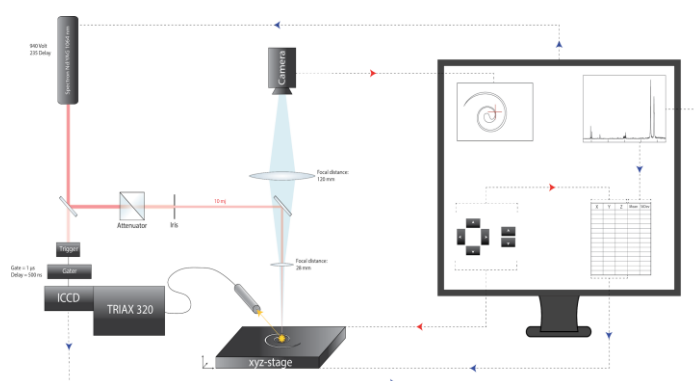


Fig. 1. Experimental setup using an acquisition process over two phases. Red arrows indicate the process of sample targeting, blue arrows indicate the process of irradiation and measurement. During acquisition, an infrared laser beam is focused on the sample to create plasma in a ~90µm sample area. The emitted light is collected, spectrally resolved and instantly displayed as spectrum on the computer.

Experiments

For the experiment, I used three samples. In all three cases the shell had previously been sectioned along the direction of growth and thus provided a flat surface for me to analyse.

The sections were analysed in both modes (Fig. 2). First, I created a map of the elemental ratios by using the accumulation mode. This allowed me to get a good idea of larger trends in the elemental composition of the shell and to identify patterns that are likely not related to environmental change. Only afterwards I selected an area of interest (black lines) that was analysed in the more detailed single shot mode following the direction of growth.

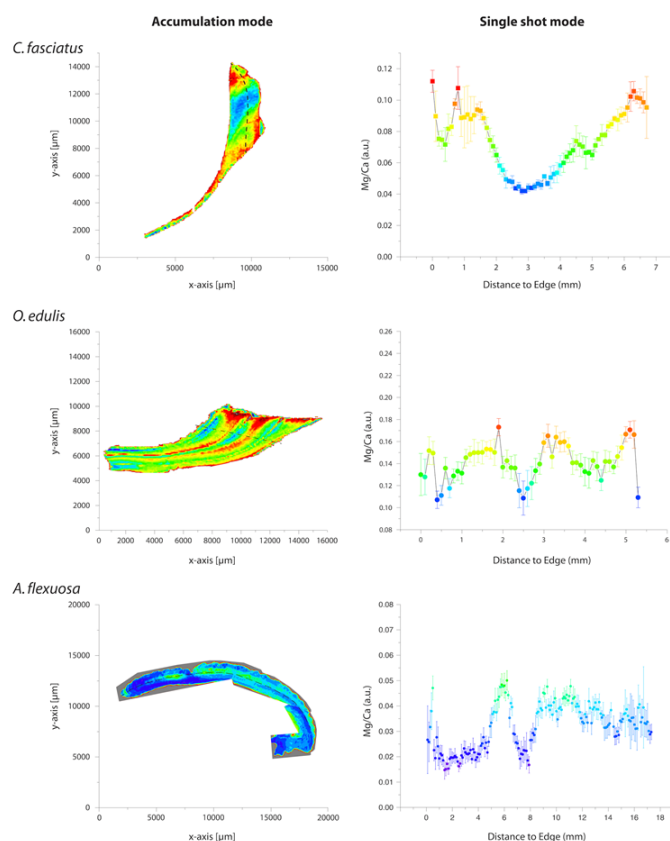


Fig. 2. LIBS results of three shell samples. Left column: mapped Mg/Ca intensity ratios of shell samples with direction of growth and sample path for single shot mode indicated (black dashed line), colour-mapping identical to graph on the respective right with red being high values and blue being low values. Right column: Mg/Ca intensity ratios plotted by distance to edge, colours of data points identical to mapped values.

All three shells produced Mg/Ca intensity ratios that described somewhat cyclical patterns, as is expected when analysing records on a seasonal scale. However, all specimens also had isochronous parts within the same growth increments where the values would deviate from the general cyclical trend, indicating that other factors control the elemental ratio as well (Marali *et al.*, in press).

In *C. fasciatus*, the single shot mode shows high values at a 0–2 mm distance to the shell edge, with a short decrease at 0.3 mm, before a larger decrease from 0.09 Mg/Ca to 0.04 Mg/Ca at 3.0 mm. Afterwards, there is an increase to above 0.10 Mg/Ca over the next 4 mm.

Despite this being the general trend within the sample, the map of ratios shows quite clearly that some parts outside the sampling path of the linear measurement (black line) deviate from those values. Similar spatial trends were found by Poulain *et al.* (2015) in *Ruditapes philippinarum* and indicate a non-environmental influence.

The *O. edulis* sample shows similar results. Measuring along the direction of growth in single shot mode, a repetitive pattern is apparent with peaks at ~0.17 Mg/Ca

and lows at ~0.11 Mg/Ca. However, the map shows areas in the top right that generally produce higher values than areas in the bottom left, even though the areas cover increments that grew at the same time. This could be explained with the averaging of growth increments in the bottom left of the map, that are too thin to be sampled individually. Potentially high values could be mixed together with other thin growth increments that produce lower values (Shirai *et al.*, 2014). However, this effect would also prevent extremely low values, which were still reached.

Variations of Mg/Ca values outside the linear sampling path were also found in *A. flexuosa*. The mapped ratios separate the shell section into three parallel growing layers (interior, centre, and exterior). Albeit growing at the same time, they almost consistently produce different Mg/Ca values, with the central one having higher values than the others. Similar ‘zonation’ was found by Lazareth *et al.* (2013) in *Protothaca thaca* and Freitas *et al.* (2009) in *Mytilus edulis* as well as *Pecten maximus*, who suggest sampling *P. maximus* within the mid-regions of the shells for more consistent environmental proxy data.

The reason behind the spatial patterns in isochronous parts of the shells analysed above requires more thorough analyses, before they can be used as seasonal or environmental proxy. Although there are cyclical variations that could well be controlled directly or indirectly by seasonal environmental change, it will be necessary to clearly link elemental/Ca ratios to specific changes. Otherwise it will be difficult to apply the same seasonal control to archaeological specimens and make consistent interpretations of the archaeological dataset.

Summary

With these experiments I showed the application of an automated LIBS setup to acquire elemental ratios from in situ shell carbonate. This was realised with the use of a LIBS imaging setup that offered a spatial resolution at a scale of ~100 μm and an acquisition speed of ~20,000 spectra/h. The setup proved the feasibility of efficiently acquiring elemental ratios from shell carbonates using LIBS, which will directly translate into lower costs per data point.

However, I have not yet linked the elemental ratios of the LIBS values to distinct environmental change, although cyclical changes were visible that suggest seasonal patterning. A validation based on modern shells and contemporaneous environmental data is still needed to fully make a case for the use of the presented elemental ratios as seasonal proxies. This will be the next step of the ACCELERATE project. The variability of the elemental ratios in isochronous parts will make this more difficult

and it is likely that different solutions need to be found for different shell species and environments. That said, the possibility to quickly assess elemental ratios will be beneficial in carrying out the analyses of more shell specimens in a shorter time frame than previously possible.

As the project is still ongoing and I am constantly aiming to further develop the method, I invite interested readers to contact me and share their suggestions or ideas.

Acknowledgements

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Marine resources on medieval archaeological sites in northwestern France: where are the seashells ?

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This paper is an abstract of the French version of “L’exploitation des ressources marines par les populations médiévales: un premier bilan des coquillages découverts en contexte archéologique entre Manche et Garonne”, *Revue d’histoire maritime*, 21, 2015, pp. 367-387.

Introduction

As we have been witnessing for several years now an increased interest for food history, new disciplines have

developed to study what is contained in the ground. Among those, archaeomalacology is unfortunately under-exploited, especially for historic periods. Unfortunately indeed, since written sources are laconic about the exploitation of marine molluscs. Archaeological data such as the weight of invertebrates amongst the marine products exploited by medieval human populations, therefore, are privileged means of discussion. With this aim in mind, an inventory has been conducted to monitor the presence of seashells and crustaceans on medieval archaeological sites in France, from the Breton coast of the Channel to the Garonne's estuary. It is part of a doctoral thesis (still in preparation), conducted by L. Le Goff*.

Methodology

This inventory has been initiated by consulting monographs and, more importantly, archaeological journals which were covering the geographical and chronological areas, namely the Breton coast of the Channel and the northern Atlantic French coast, from the 5th to the 15th century. These journals were local (*Revue Archéologique de l'Ouest*, *Bulletin de l'Association Manche Atlantique pour la Recherche Archéologique dans les Îles*, etc.) or national (*Gallia*, for example). This research produced little results. The few mentions of seashells in medieval sites were mostly referring to funeral contexts. The marine invertebrates in food waste were consequently invisible.

To address these gaps, the inventory eventually relied on the systematic consultation of grey literature available in regional services of archaeology. All excavations and survey reports referring to medieval contexts have been examined, mostly on paper, accumulating to a total of about 2000 reports.

Seashells have indeed been exploited during Middle Ages...

... with geographical variations

A total of 166 archaeological sites on which marine invertebrates were discovered have been monitored. Exploitation of seashells during Middle Ages has indeed occurred, and not necessarily in a limited scale. Firstly, the location of these sites highlighted strong geographical disparities (Fig. 1). The department of Charente-Maritime in itself concentrates 84 sites, compared with 3 in Charente, 19 in Vendée, 18 in Loire-Atlantique, 7 in Maine-et-Loire, 9 in Côtes-d'Armor, 7 in Finistère, 5 in Ille-

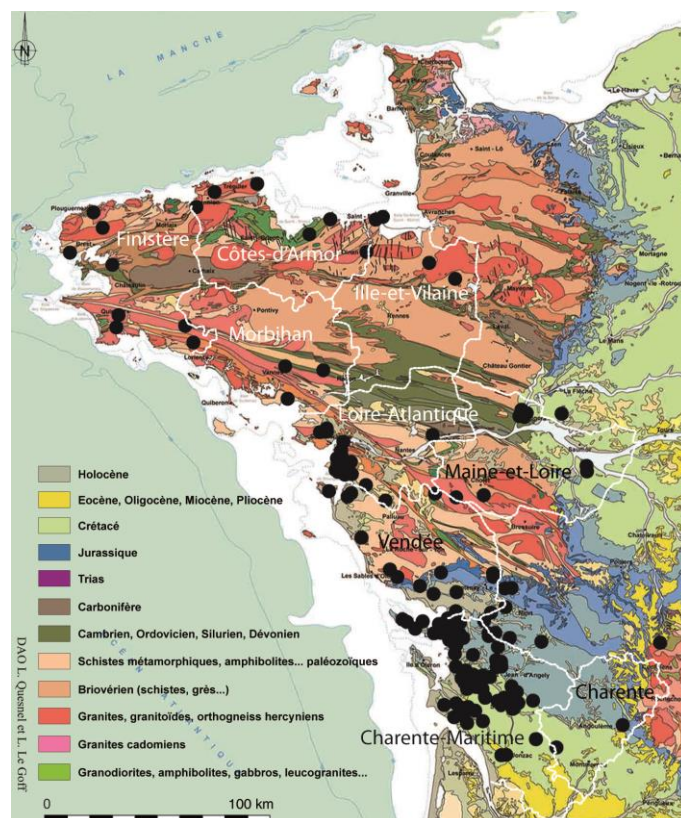


Fig. 1. Inventory of medieval archaeological sites, where malacological remains have been monitored.

et-Vilaine and 5 in Morbihan. One might wonder whether human populations from Charente-Maritime's department were much keener on seashells than in other areas. The most obvious explanation lies within the nature of the soil. The geological map displays the limit between the Armorican Massif and the Aquitaine basin, which coincides exactly with the limit observed within the density of sites. The acidic soils in the Armorican Massif may have caused a more severe degradation of seashells, if not their complete disintegration, while the calcareous soils in the Aquitaine basin may have furthered their conservation.

However, geology might not be the only factor. A great variability in the density of medieval archaeological sites has been observed as well: 3369 in Brittany, 5203 in Pays de la Loire, 6321 in Poitou-Charentes. It could be linked with the history of the discipline. Archaeology hasn't developed everywhere in the same way: in Brittany for example, research have mostly concerned megaliths at first. Besides, the personal interest of archaeologists and volunteers have surely played a role in this heterogeneous distribution of seashells deposits in Middle Ages. For instance, the inventory map displays a little area south of the Loire which seems to concentrate several waste dumps containing marine invertebrates, even though it stills lies on magmatic basement, which is not

* L. Le Goff, *Exploitation des invertébrés marins le long de la côte atlantique française au Moyen Âge: de l'alimentation à l'environnement*. University of Rennes 2, in process

propitious for shells conservation. These particular sites have all been reported by the same archaeologist: Michel Tessier, who studied this area as part of his doctoral thesis (Tessier, 1980). In conclusion, it is likely that several factors, both natural and anthropogenic, have combined to result in these disparities.

... only by littoral populations ?

Beyond these first observations, the inventory highlighted other tendencies about the exploitation of molluscs. Most of archaeological sites with seashells remains are located in immediate proximity with the coastline. In this case, temptation is great to conclude that only littoral populations are consuming marine invertebrates. Although they were indubitably regular consumers, it would be imprudent to assume that inland populations were not consumers as well. In fact, this inventory is intrinsically linked to the discovery of *shells*, and we have proofs – archaeological and textual – that the actual meat didn't necessarily travel within its shell. There are indeed gigantic accumulations of oyster shells on the French Atlantic coast, such as those in Saint-Michel-en-L'Herm (Fig. 2) (Gruet and Prigent, 1986).

After many years of debate, researchers have finally agreed that these accumulations were the results of human activity: a few tools and some coins have been discovered within, and numerous oysters valves were displaying marks related to their opening. Such an enormous amount of shells – their countenance has been estimated up to several billions – reflects doubtlessly of a nearly industrial exploitation of oyster beds. Unfortunately, we know no mention of this kind of exploitation in medieval written sources. A few administrative documents from the modern period mention the way shellfish, and oysters in particular, can be transported and sold, including the possibility of removing the flesh: according to the commissioner N. de La Mare, author of *Traité de la police* in 1719 (de La Mare, 1719), it can be transported unaltered or in a marinade. These practices may have concerned other species too. Another waste dump has been discovered at Saint-Brévin (Loire-Atlantique) (Tessier, 1984); its volume has been estimated to 25 m³, thus containing approximately 1,140,000 mussels and 36,000 peppery furrow shells, with a few animal bone fragments. Such an accumulation does *a priori* not coincide with domestic consummation. In these cases, the archaeological track stops on the coastline, even if the flesh continues its way to inland territories.

Archaeomalacological remains have nevertheless been observed in some inland sites. It is worthwhile to note

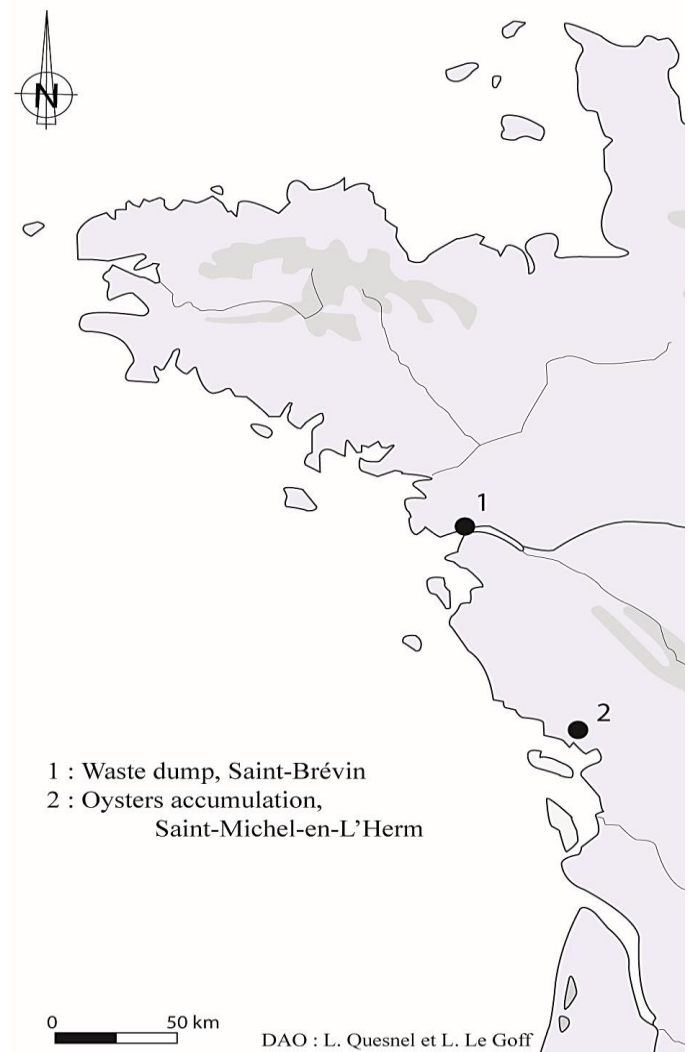


Fig. 2. Localisation of the sites cited in this paper.

that almost all of those have privileged social standing (abbey, castle essentially but urban contexts also): wealthy populations were probably the ones importing the seashells, being able to afford transportation from the coastline. In addition, those inland sites were predominantly settled in immediate proximity with a watercourse, thus indicating conveyance by waterways.

... for various purposes

A vast majority of seashells remains are admittedly food waste, essentially composed of oysters and mussels*. These two species are also the most frequently cited in medieval cookbooks. There seems to be a few regional tendencies as well, such as the recurrence of limpets in Brittany and of variegated scallops in Poitou-Charentes. These observations can although be biased: some species can be hard to determine as a non-specialist, hence a possible under-estimation. In addition, excavation and sampling methods have a great influence on archaeomalacological results: without sieving, risks are high to

* We kept here vernacular names, as they were used by archaeologists.

cause major underestimation of the presence of fragile species, such as the mussel *Mytilus edulis* (Linnaeus, 1758) or the peppery furrow shell *Scrobicularia plana* (da Costa, 1778).

Other utilisations of seashells have although been detected. The shells, once emptied of their flesh, have sometimes been reemployed as a building material: they could be integrated in mortars and might have been a lime source. Furthermore, the great scallop has been used as a kind of ornament by pilgrims on their way to Saint James of Compostella. Finally, a few traces of purple production have been reported, with the presence of systematically broken dog whelks and sting winkles (Dupont, 2011).

Conclusion

It remains difficult to study the exploitation of marine invertebrates in the Middle Ages from a generalized point of view; archaeomalacological studies are still too scarce and textual data too scarce. However, as the discipline is developing, a few tendencies are emerging about consummation preferences, cooking habits, variety of utilisations, geographical disparities and means of

transportation. Those first results are thus opening a research area that we hope to be long and fruitful.

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Abstracts

PhD Abstracts

A Novel Application of Sclerochronology: Forging New Understandings of Aboriginal Occupation in the South Wellesley Archipelago, Gulf of Carpentaria

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Changing relationships between people and their environments result in modified patterns of land-use and occupation as populations respond to fluctuating conditions across space and through time. Understanding these relationships occurring on a variety of scales is integral to achieving nuanced interpretations of fundamental Aboriginal lifeways. This is particularly salient in contexts characterised by stark seasonal shifts in climate, which have long been suggested to act as key drivers behind fundamental decision-making processes. For Aboriginal groups living along Australia's tropical north coast these seasonal changes coincide with the monsoonal cycle, with ethnographic data demonstrating that seasonality permeates associated behavioural and cultural systems. Numerous authors have attempted to explain change evident in the archaeological record using broad models based upon wide-ranging concepts such as

shifts in ENSO intensity. However, these broad models map poorly onto local-scale and/or short-term patterns, masking diversity and complexity. It is therefore integral that researchers re-evaluate how behavioural patterning is characterised and interpreted.

This research explores patterns of Kaiadilt Aboriginal occupation in the South Wellesley Islands, Gulf of Carpentaria, through a targeted study of seasonality in site-use. Select methods from a sclerochronological framework, particularly stable isotopic analyses of molluscan shell carbonates, are utilised to analyse specimens (*Gafrarium pectinatum*, *Marcia hiantina*, and *Gelonia erosa*) from both modern and archaeological assemblages. Results from modern specimens are combined with contemporaneous environmental datasets to characterise relationships between ambient conditions and shell geochemistry. This allows the efficacy of target mollusc species to be tested as well as providing an interpretative framework for archaeological data. Seasonality of occupation is determined for archaeological material excavated from three sites across Bentinck Island spanning the last 1500 years to generate a high-resolution chronology of site-use.

Instrumental observations of modern environments highlight stark seasonally timed hydrological shifts, however corresponding fluctuations were not found in all

target mollusc taxa. The mangrove bivalve *Gelonia erosa* and intertidal bivalve *Gafrarium pectinatum* were both deemed unsuitable for use within the context of this research owing to irreconcilable physiological and ecological complications. Conversely, the subtidal bivalve *Marcia hiantina* was found to be an unambiguous recorder of environmental conditions, as well as being the dominant archaeological species, and thus is employed as the key proxy for characterising patterns of past seasonality.

Archaeological findings demonstrate direct links between seasonal climatic patterns and the timing and periodicity of site-use, although the strength of these relationships fluctuate through time. Early occupation of the South Wellesley Islands from as early as 3500 years ago appears highly seasonal, with periods of use timed to coincide with the dry season to take advantage of conditions that assist wide-ranging foragers in undertaking periodic visitation of the island group. Subsequent to the permanent occupation of the South Wellesley Islands by the Kaiadilt in the last 800 years, patterns of repeated use are evident with groups periodically occupying sites while moving across the local landscape again dominated by dry season use. The most recent periods of occupation in the last 250 – 300 years suggest a move towards decreased mobility with longer residency times and more sedentary behaviour evidenced by both dry and wet season occupation at key sites. Changes to occupation patterns are likely linked with increases in population size and density. Moreover, the recent stabilisation of sea levels along with more frequent inclusions of fish remains within the archaeological record suggest that stone-walled fish trap complexes were increasingly utilised during late periods of occupation. The static nature of this important resource infrastructure together with the need for continuous maintenance likely further encouraged sedentary behaviours, establishing strong ties between Kaiadilt groups and specific areas as well as potentially facilitating the development of ethnographic land tenure systems.

Results demonstrate the efficacy of scleroisotopic methods in tropical Australian contexts, provided relationships between target mollusc taxa and environmental conditions are well understood. This affords the opportunity for archaeologists to approach increasingly nuanced characterisations of fundamental drivers behind Aboriginal decision-making processes that led to changing behavioural and cultural systems. Moreover, findings demonstrate the presence of highly complex patterns of occupation associated with offshore island contexts, requiring local-scale research to accurately characterise as inter-regional or continental models do not accurately reflect responses to change at high-resolutions. Results also contribute to recent

discussions regarding changes in social organisation, running parallel to suggestions of a broader trend towards decreased mobility coinciding with growing populations and emerging social complexity. Most importantly, this research provides a salient argument for the construction of broader narratives from local-scale understandings to allow for the complexity and diversity inherent to Aboriginal cultures.

Paper Abstracts

Marine shell hoard from the Late Neolithic site of Čepin-Ovčara (Slavonia, Croatia)

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Abstract

The focus of this paper is the ornament hoard from the Sopot culture site of Čepin-Ovčara in eastern Slavonia (the Republic of Croatia). The hoard contained pendants and beads made of shells of marine clam *Spondylus gaederopus* and scaphopod *Antalis vulgaris*. The paper analyses the context and use wear of the objects in the hoard. The results form a basis for the reconstruction of the role of some of the items and the ways in which they were worn; the premise that the dynamics and mechanisms of acquisition of ornaments made of the two Mediterranean mollusc species could have differed; and the identification of a cross-cultural pattern of deposition of ornament hoards.



Reconstruction of the belt made of spondylus pendants: a) outer surface, turned away from the body; b) inner surface, facing the body.

Zooarchaeology of Three PreHispanic Sites in the Southern Georgia Bight: Evidence for Cultural and Ecological Continuity, Flexibility and Resilience

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Abstract

Zooarchaeological research in the central Georgia Bight has arrived at a point where human subsistence behavior over space and time can be modeled. Elizabeth J. Reitz and colleagues have offered a testable hypothesis that subsistence rested on three cultural and ecological pillars: continuity, flexibility and resilience. For nearly 5000 years, and possibly longer, resilient estuarine finfish taxa that easily recover from intensive harvest were most frequently exploited, while terrestrial and littoral zone taxa were less commonly consumed. Stochastic processes common to the marine environment and extreme semi-diurnal tides that cycle between two and three meters must have selected for flexibility within everyday subsistence planning. The question arises, do preHispanic subsistence practices represented in the estuaries of the southernmost extent of the Georgia Bight, and points just south, rest on these three pillars? Well recovered zooarchaeological assemblages from Castle Windy (A.D.1190-1420), Turtle Mound (A.D. 1280-1640) Canaveral National Seashore, FL and Site 8SL1146 (A.D. 1090-1388) Fort Pierce, FL validate this approach to resource use. The assemblages contain core finfish species such as mullet, spot, Atlantic croaker, and hardhead catfish whereas among shellfish, Eastern oysters and coquina clams fill a similar role. The zooarchaeological record documents a rich and stable fishery that was primarily associated with the estuarine system.

Conference Abstracts

Small Tails: The Zooarchaeological Record of 5000 years of Shrimping (Penaeidae: *Penaeus* spp.) along the Georgia Bight

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Paper presented at the Southeastern Archaeological Conference 2016, Athens GA

Abstract

The presence of skeletal remains in zooarchaeological assemblages are fundamentally determined by complex taphonomic processes that occur before and after deposition and sampling methods that give each anatomical element, or parts thereof, an equal chance of recovery. Various taxa may avoid detection when inadequate screen gauges are used and/or in the presence of poor preservation conditions. Based on these precepts we show that within the Georgia Bight mandibles of Decapod shrimp (Family: Penaeidae) occur in the zooarchaeological record for nearly 5000 years, suggesting a longstanding pre-Hispanic tradition of shrimp harvest and consumption that has, until recently, remained unexplored.

The data show that the earliest record of Penaeid shrimp occurs in the Archaic period faunal record of McQueen Shell Ring (2460BC – 1850BC), St. Catherines Is., GA (Shrimp Mandibles N = 15) and the Rollins Bird Sanctuary (2200BC), Duval County, FL (Shrimp Mandibles N=1). The use of this resource can also be tracked to the Woodland period (AD300-700) at Cathead Head Creek, Darien, GA (Shrimp Mandibles N = 1) and Kings Bay, GA (Shrimp Mandibles N= 288). Shrimp were also used during the Mississippian period (1200-1500) at Cathead Creek (N=1), Kings Bay (N=1), and the Jacksonville Electric Authority (N=8), FL. The analysts conducting the research at these sites collectively identified 224,457 Number of Individual Specimens (Vertebrata) in order to recover 334 shrimp mandibles. This does not include the molluscan remains that are so common in these assemblages. Their research further validates a long tradition of fishing and shellfishing in the estuarine shallows of the Georgia Bight where resilient species were targeted.

Macroscopic Shell Growth Increments in Modern and Archaic Period (ca. 4500 BP) Hard Clams (*Mercenaria* spp.) from St. Catherines Island, Georgia: Oxygen and Carbon Isotopic Authentication of Seasonal Shell Growth

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Paper presented at the Southeastern Archaeological Conference 2016, Athens GA

Abstract

The periodicity of hard clam *Mercenaria* spp. incremental shell growth has been established as a powerful tool in characterizing the seasonal harvest and anthropogenic impact on Archaic period resources. Modern analogues of hard clam seasonal shell formation are well documented throughout its range; however, research has shown that climatic changes in the marine environment can significantly and quickly alter the regional pattern of skeletal growth in the organism. This research analyzes the variability of oxygen isotopes in shell carbonate to authenticate seasonal shell growth in modern and Archaic period hard clams from St. Catherines Island. These data also provide an opportunity to address the question of what habitats were harvested. The question arises, were hard clams collected from habitats with varying salinities or were they collected from distinct zones near the habitation sites? The carbon and oxygen isotopes represent one tool that can help to estimate which habitats were used in the harvest of St. Catherines Island Archaic period hard clams.

Shell Growth in the Hard Clam (*Bivalvia: Mercenaria* spp.): A Tool for Assessing Human Harvesting Pressure in Southeastern North America

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Abstract

In many cases social strife can be traced to the mismanagement of natural resources that satisfy human subsistence. Shell middens of southeastern North America contain an extensive record of enviro-cultural interactions of the mid-Holocene to post Hispanic contact. One of the most informative research questions asks - is there evidence in the zooarchaeological record for anthropogenic impact on natural resources? Is there evidence for resource overexploitation such as changes in faunal population dynamics (e.g., ontogenetic age) or impactful changes in environmental parameters (e.g., water quality) that support life? Without the necessary tools these questions go unanswered, hampering our understanding of the elements of enviro-cultural interaction.

This long-term research project examines the growth history of the hard clam (*Mercenaria* spp.), a prominent constituent of most southeastern USA shell middens. Hard clams form a couplet of light and dark shell growth increments each year. Like tree rings, a count of each annual shell increment determines the ontogenetic age of an individual. Longevity in these populations can occasionally exceed 100 years. We also analyze the light stable isotope profiles of oxygen (¹⁸O/¹⁶O) and carbon (¹³C/¹²C) in hard clam shells. With these tools in hand we find that for nearly 5000 years Native American harvesting practices diminished the population age classes of the hard clam beds. The light stable isotopic study does not support preHispanic impact on water quality; however, modern isotopic profiles indicate greater freshwater input into the system. These data suggest that anthropogenesis may occur within any level of cultural complexity.

Call For Papers

Shell beads of Eastern America

This volume will feature studies of ancient shell beads from Eastern North America. Surveys and analytical studies of the archaeological record of a site, a state, a culture, a species, or depositional pattern are sought. Please contact the editor Cheryl Claassen to discuss your idea (claassencp@appstate.edu). **The papers will be due March 15, 2017.**

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- Temporal and spatial distribution of *Leptoxis* beads

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Vancouver, British Columbia, Canada

29 March - 2 April 2017

Recent advances in the microscopic and geochemical study of biological hard tissues have broadened archaeological understandings of past human-environmental dynamics, especially in island and coastal settings. Hard tissues that contain macro- and micro-incremental growth structures, such as fish otoliths, corals, coralline algae, teeth, and shells serve as ideal proxies as they record local environmental conditions in their structures as they grow. In addition to past environmental information, the analysis of hard tissues reveals insights into changes to animal populations from climatic stress, as well as resource depletion. When combined with ancillary archaeological evidence, these data can provide new insights into seasonality, sea surface temperature, and palaeosalinity, in addition to understanding both long- and short-term patterns of landscape and resource use. This session highlights the interdisciplinary nature of this research, connecting archaeologists, biologists, geochemists, and sclerochronologists, to share their latest research and methods in hopes of propelling and strengthening future archaeological investigations of hard tissues.

Website:

<http://saa.org/AbouttheSociety/AnnualMeeting/tabid/138/Default.aspx>

Paper submission closed.

with expertise in a wide range of analytical techniques including biomolecular and ancient DNA analysis, stable isotopes, mineralogy and metallurgy, archaeobotany, conservation and heritage science, residue analysis, geoarchaeology, and computational modelling. Research themes covered include mobility, migration and cultural exchange, plant-animal-human relationships, material culture and technologies, climate and environment, subsistence and diet, heritage management, and the application of archaeological science in commercial archaeology.

Website:

<https://www.ucl.ac.uk/archaeology/calendar/conferences/ukas2017>

Paper submission closed.

Annually resolved archives of marine climate change (CL1.18/OS2.9) - European Geosciences Union General Assembly

Vienna, Austria

23 - 28 April 2017

We are inviting oral and poster presentations that focus on annually resolved archives of marine climate change, including in particular archives from bivalve molluscs, corals, coralline algae, sclerosponges, and fish otoliths. Such high-resolution proxy archives have the potential to make important contributions to our understanding of the regional and near-term impacts of climate change. This session will highlight advances and ongoing research in all the disciplines associated with these archives, including:

- the biological and environmental drivers of growth increment formation
- the use of growth rates as well as structural and geochemical data as proxies of past marine environments and marine climate
- the use of these archives in proxy-model comparisons

UK Archaeological Science Conference

University College London, central campus, London

5 - 8 April 2017

UKAS is a biennial international conference which aims to bring together researchers from all areas of archaeological science. The conference attracts scientists

Website:

<http://meetingorganizer.copernicus.org/EGU2017/session/24431>

Paper submission closed.

Iberian Zooarchaeology Meeting, In Association with the 5th Iberian Peninsula Archaeomalacology Scientific Meeting – 5RCAPI

Universidade Do Algarve, Faro, Portugal

26 - 29 April 2017

In the last decade, zooarchaeology has seen exceptional theoretical and methodological advances. The number of scientists dedicated to this discipline in Iberia has increased exponentially, resulting in a significant collection of works focused on a variety of fauna materials from different periods and with diversified approaches. Inaugurated in 2010, the RCAP already has a long tradition in the study of mollusks, echinoderms and crustaceans in an archaeological context. This meeting has valued interdisciplinary sharing since the beginning, assembling researchers from prehistory, history, zooarchaeology, archaeology, biology and more.

Website: <http://ezi2017faro.wixsite.com/ezi2017en>

Facebook: [EZI RCAP FARO](#)

Paper submission closed.

Do species move, adapt or die? Exploring past biodiversity, ecological change and community dynamics in the fossil record – 5th PAGES OSM meeting

Zaragoza, Spain

9 - 13 May 2017

The remains of many species are well-preserved in Quaternary palaeoecological deposits and offer the opportunity to explore the formation, development and dynamics of biological communities over long temporal periods and address a range of key ecological and conservation questions. These include issues such as how species and communities differ in their responses to changing environmental conditions and whether these differ over time-scales. Do species primarily move, adapt or die? Are responses essentially the same over time or is there evidence for adaptation or niche evolution? What can the fossil record tell us about the vulnerability of particular communities and species – are some more vulnerable to extinction or declining populations

compared with others? For some groups, taxonomic issues also present significant challenges to understanding long-term community changes, although for others, new approaches to taxonomy, analytical advances (e.g. aDNA analysis) and novel modelling methods offer the potential to enhance and indeed revolutionise ecological interpretations and our understanding of species responses to future climate change.

We solicit papers that address these themes, dealing with all types of biological proxy records from palaeoecological and palaeolimnological contexts, using standard palaeoecological methods, species distribution models, novel modelling methods, aDNA approaches and phylogeography. We particularly encourage papers that seek to explore species and community spatio-temporal dynamics and interactions, spread, extinction and niche evolution, over the different time-scales that apply to Quaternary studies.

Website: <http://www.pages-osm.org/>

Paper submission closed.

1st announcement of HiRes2017 – a NSF sponsored workshop to explore new developments of high-resolution in situ studies for proxies of paleoclimate

University of Wisconsin-Madison, USA

18 - 21 June 2017

SIMS and laser techniques provide a new level of climate resolution through analysis of isotope ratio and trace element compositions at micron-scale. In situ analysis permits correlation of imaging with geochemistry and selection of features that could not otherwise be interrogated. These recent advances yield improved temporal resolution and promise an important new level of understanding for many paleoclimate proxies. Sub-annual to sub-daily resolution is possible for many proxies facilitating studies of seasonality or animal growth and migration. The workshop will be conducted in parallel with tutorial demonstrations of the IMS-1280 Ion Microprobe in the WiscSIMS Lab. The goals of the meeting are to explore new capabilities and new applications of in situ analysis to paleoclimate and to acquaint participants with SIMS techniques.

Please indicate your interest in HiRes2017 at:

<https://goo.gl/forms/hkAmm8LPSPXvKqT82>

Website:

<http://www.geology.wisc.edu/~wiscsims/HiRes2015/>

Member News and Updates

UISPP Commission on Coastal Prehistory and Submerged Landscapes

This is to announce the creation of a new international research network on 'Coastal Prehistory and Submerged Landscapes' (CPSL) as a Commission under the auspices of the UISPP - Union Internationale des Sciences Préhistoriques et Protohistoriques – and to solicit your interest in becoming a member and/or participating in the next international congress, which will take place in Paris in June 2018. See: <http://www.uispp.org/coastal-prehistory-and-submerged-landscapes>.

The Commission is led by Geoff Bailey, Karen Hardy (ICREA, Barcelona) and Matthew Meredith-Williams (La Trobe University, Melbourne, Australia).

The purpose of the Commission is to foster international communication and collaboration across the world and across the many disciplines and interests associated with research on our theme. The theme is broad with a number of overlapping interests including but not confined to:

- The archaeology of coastal sites, especially shell middens
- Submerged landscapes and underwater prehistory
- Archaeomalacology and biomolecular archaeology
- Cultural heritage.

We have worked on all these themes and in many parts of the world, and believe that new advances in the future will increasingly depend on international collaboration, on comparative research that brings together case studies drawn from across the world and from all the major continents, on developing communication between people from different disciplines and different intellectual traditions, and on creating opportunities for a new generation of researchers. Our Commission offers an opportunity to develop all of those aspirations.

Formal membership involves a fee of €75 (€35 for graduate students) and gives priority and some concessions in the major UISPP Congresses held every 3 years, and in annual Commission activities. These may include smaller workshops and meetings and an annual report. We are also looking into developing a website with a dedicated Members' area where publications and other useful information and reports can be posted. For further details of membership see the website at:

<http://www.uispp.org/membership>.

If you are interested in organising a session at the Paris Congress on a specific theme within our broad range of interests and/or interested in making a presentation, please let us know (formal membership is not essential to participate in the Congress). **The formal deadline for proposing a session to the Organising Committee is 31 March 2017.**

Recent Publications

Books

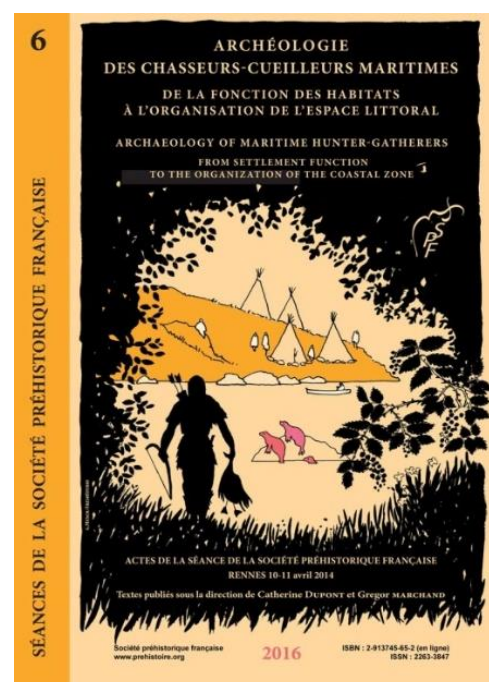
Dupont, C. and Marchand, G. (dir.) 2016. *Archéologie des chasseurs-cueilleurs maritimes. De la fonction des habitats à l'organisation de l'espace littoral*.

Archaeology of maritime hunter-gatherers. From settlement function to the organization of the coastal zone.

Actes de la séance de la Société préhistorique française de Rennes, 10-11 avril 2014 (ISBN : 2-913745-2-913745-65-2).

Summary

Anthropologists have long paid particular attention to maritime hunter-gatherers because of the wide variety of social organizations they developed all over the world, as well as the diversity of their technical systems, whether for fishing, food preservation or storage. At the same time, archaeologists focused their attention on the very emblematic shell middens in coastal or estuarine sites,



which often combine dumps, graves, homes and areas of daily activities. In Europe the recent resumption of exploration of those sites has shed light on all their informative potential for answering questions about the relations between humans and their maritime environment. This new dynamism in research is further buoyed by the diversification of archaeology-related disciplines, which provides different views of these exceptional remains. The Rennes workshop that took place in April 2014 enabled archaeologists from several countries to make assessments in all latitudes and along all the oceans. They revealed that the sites could not have been conceived outside of wider economic and social networks. This publication also provides an opportunity to reflect on the role of these very special human groups during the Prehistory of our species.

Free access to publication at:

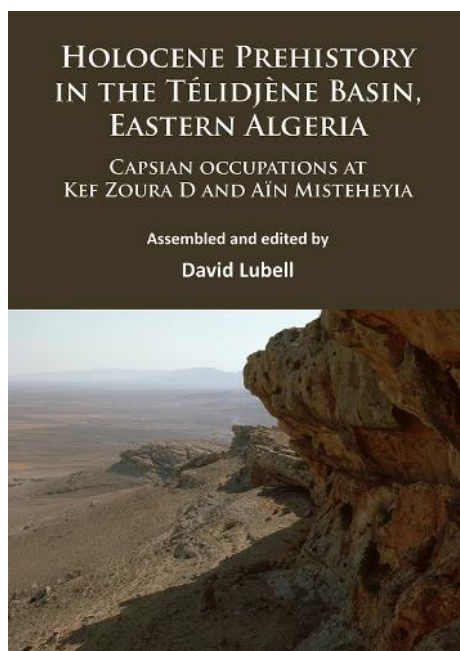
http://www.prehistoire.org/shop_515-40092-5204-800/acces-libre-seance-6-archeologie-des-chasseurs-cueilleurs-maritimes.html



[Archéologue des coquillages : Catherine Dupont, médaille de bronze du CNRS 2014](#)

Lubell, D. (ed.) 2016. **Holocene Prehistory in the Télijdjène Basin, Eastern Algeria. Capsian occupation at Kef Zoura D and Aïn Misteheyia.**

Archaeopress (printed ISBN 9781 78491 3731; epublication ISBN 9781 78491 3748).



Summary

From 1972 to 1979, field work was conducted in the Télijdjène Basin, Eastern Algeria, as part of a project called The Prehistoric Cultural Ecology of Capsian Escargotières.

The primary objective was the controlled excavation of two stratified Capsian sites, the open-air escargotière Aïn Misteheyia (1973 and 1976) and the rock shelter Kef Zoura D (1976 and 1978), both of which have remained incompletely published until now. Aïn Misteheyia and Kef Zoura D have proven to be key sites in a discussion that has been ongoing since at least the 1930s when Vaufreyc published his interpretation of Capsian stratigraphy, trying to understand if there was a temporal succession between the Capsien typique and the Capsien supérieur. These are the only Capsian escargotières excavated with modern methods and extensive radiocarbon dating that have a clear stratigraphic sequence in which both variants of the Capsian are represented. We show that Capsien typique precedes Capsien supérieur, that the latter saw the introduction of a new technique for the production of blanks (pressure flaking), that the change is more-or-less contemporary with the 8200 cal BP cold event, and that it was accompanied by a subtle change in a subsistence regime of continued foraging that included collection and consumption of enormous numbers of land snails, despite the introduction of some herding of apparently introduced domestic stock in neighbouring regions that suggests the changes observed at these two sites may have eventually led in some areas to the introduction of Neolithic subsistence patterns, although there is as yet no clear evidence for this in the central Capsian area of eastern Algeria and southern Tunisia. Aïn Misteheyia was described in two previous reports in *Libyca* where the land snail faunas were analysed, but the artefact illustrations were never published and appear here as an addendum. Four chapters describe the chronology, stratigraphy, lithic, faunal and charcoal assemblages from Kef Zoura D. In addition, there are chapters analysing the well preserved assemblages of worked bone.

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